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John Giles
Dewen Wang
Wei Cai

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Forschungsinstitut
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Institute for the Study
of Labor

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John Giles
World Bank and IZA

Dewen Wang
World Bank Beijing Office

Wei Cai
World Bank

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

The Labor Supply and Retirement Behavior of China's Older Workers and Elderly in Comparative Perspective*

This paper highlights the employment patterns of China's over-45 population and, for perspective, places them in the context of work and retirement patterns in Indonesia, Korea, the United States, and the United Kingdom. As is common in many developing countries, China can be characterized as having two retirement systems: a *formal* system, under which urban employees receive generous pensions and face mandatory retirement by age 60, and an *informal* system, under which rural residents and individuals in the informal sector rely on family support in old age and have much longer working lives. Gender differences in age of exit from work are shown to be much greater in urban China than in rural areas, and also greater than observed in Korea and Indonesia. Descriptive evidence is presented suggesting that pension eligible workers are far more likely to cease productive activity at a relatively young age. A strong relationship between health status and labor supply in rural areas is observed, indicating the potential role that improvements in access to health care may play in extending working lives and also providing some basis for a common perception that older rural residents tend to work as long as they are physically capable. The paper concludes with a discussion of measures that may facilitate longer working lives as China's population ages.

JEL Classification: J26, J14, O15, O17, O57

Keywords: retirement, population aging, labor supply, pensions, China, Indonesia, Korea

Corresponding author:

John Giles
Development Research Group
The World Bank, MSN 3-311
1818 H St NW
Washington, DC 20433
USA
E-mail: jgiles@worldbank.org

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Introduction

There is keen awareness across developed and middle income countries of the developing world that increased longevity and aging populations will place significant and growing burdens on working age adults in the relatively near future. In the US and other economies with pay-as-you-go social security systems, these burdens will be transmitted through fiscal systems. Even where public transfer mechanisms are not as important, working age adults may nonetheless face increasing burdens associated with supporting the elderly through both financial and in-kind transfers.[1] Increasing the retirement age is frequently viewed as one feasible means of easing burdens on working age populations, and yet it is likely that exits from productive activity are shaped by household wealth and individual preferences as well as institutions and policy. Alternatively, continued participation in the workforce may reflect the ability of workers to learn new skills and to remain productive into older age. With an eye toward providing insight into the retirement decision in East Asia, this paper presents descriptive evidence on retirement and labor supply patterns in China, Indonesia and Korea.

While China's rapid demographic transition is frequently highlighted in news accounts because of the sheer size of its aging population, Korea and Indonesia are also confronting rapidly aging populations.[2] In contrast to most developed countries, however, rural and urban populations face significantly different retirement systems. Differences across rural and urban areas in both retirement patterns and access to financial support is most extreme in China, where most long-term residents in urban areas have had formal wage employment, retire at a relatively young age and receive substantial support from pensions. Rural residents, by contrast, have lacked pension support and may expect to work in farming or other agriculture-related activities until relatively late in their lives.[3] In this sense, urban residents of China with formal sector employment face

[1]Lee, Mason et al (2011) highlight the implications of population aging for sustainability of public and private transfer systems across Africa, Asia, Europe, Latin America and the United States.

[2]Recent research by demographers at the US Census Bureau suggests that the old age dependency rates in 2020 will reach 22, 19 and 13 percent, for Korea, China and Indonesia, respectively, and by 2040 these rates will rise to 53, 40 and 25 percent (Kinsella and He, 2009). A preliminary release from China's 2010 census informs us that 13.3 percent of China's population is now over 60 as opposed to 10.3 percent in 2000, while the size of the future workforce has dwindled, with individuals under 14 accounting for 16.6 percent of the population, down from 23 percent in 2000 (National Bureau of Statistics, 2011).

[3]New initiatives are currently underway in rural China. A government-subsidized contributory rural pension piloted in 2009 will be rolled out to cover all rural counties over the next three years. In cities, a new pension scheme,

retirement decisions that are more similar to those of residents in developed countries. Residents of China's rural areas, by contrast, share more in common with residents of other developing countries, and make labor supply decisions in the absence of both pension availability and the constraint imposed by a mandatory age of retirement from the formal sector.

This paper brings together information from several data sources to highlight differences in labor supply of older workers across urban and rural China, Indonesia and Korea, and to review patterns and trends in the context of institutional differences across these three countries and between urban and rural areas. For perspective on retirement patterns in East Asian economies, we then place the retirement decision in China, Indonesia and Korea in the context of employment patterns of older workers in the United States (US) and the United Kingdom (UK). In common with findings from the retirement literature focusing on developed economies, the descriptive evidence presented in this paper is suggestive of the role that ability to collect a pension (or social security benefit) plays in the retirement decision.[4]

Mandatory retirement provisions in each of these East Asian economies, however, condition decisions of when and how to exit from productive activity. While significant numbers of retirees return to work in self-employed activities or informal work after reaching mandatory retirement age, the types of work that "retirees" are able to find may be unattractive for some older workers. Differences in the mandatory retirement age for men and women in China likely contributes to differences across genders in participation in work later in life, with important consequences for relative pension wealth and relative financial security of older men and women.

After reviewing descriptive trends, we lay out an empirical model to examine correlates of labor supply with own and spouse eligibility to receive a pension, own and spouse health status and proxies for household wealth. We next review data sources and correlates of employment separately for China, Indonesia and Korea. The paper presents comparative descriptive evidence

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modeled on the rural pension program, was first introduced in July 2011 with the aim of providing financial protection in old age to non-working urban residents and informal sector workers.

[4]Blau (1994) suggests that social security eligibility contributes to relatively high exit from the labor force at age 65; Krueger and Pischke (1992) exploit design features of the US social security system to demonstrate the effects of benefits on labor force participation. Gruber and Wise (1999, 2004) present evidence from OECD economies of the effects of social security and public pension systems on labor supply decisions of older workers.

from East Asia and highlights important questions on retirement behavior in developing countries that may be addressed from new panel data initiatives currently underway.

Employment Patterns and the Retirement of Older Workers

In China, long-term urban residents with formal sector employment can expect to receive a pension upon retirement, but face mandatory retirement at a relatively young age.[5] Where urban employed men confront mandatory retirement at age 60, women in blue collar occupations are frequently required to retire at age 50, those in white collar occupations at age 55, with women in some categories (e.g., university professors) able to work until age 60. Among current retirement-age residents of urban areas, a large share is receives relatively generous pension support. By contrast, rural elderly, who had lower incomes during their working lives and less accumulated wealth than their urban counterparts (Kanbur and Zhang, 1999; Ravallion and Chen, 2007), do not typically have pension income. According to the 2005 one percent population sample, 45.4 percent of urban residents over age 60 report pension income as their most import source of financial support, but only 4.6 percent of rural residents note an important role for pension income. Instead, 38 percent of rural respondents over age 60 report that income from own labor is their most important source of support.[6]

The stark difference in employment rates of rural and urban residents reflects differences in both pension wealth and mandatory retirement provisions across urban and rural areas.[7] As evident in Panel A of Figure 1 below, which presents locally weighted regression (LOWESS) estimates of employment rates by age, China's rural residents are far more likely to be employed well after the mandatory retirement ages faced by urban residents. From the China Health and Retirement

[5]We define a long-term urban resident as an urban dweller with an urban (non-agricultural) residential registration (*hukou*) status. While considerable efforts have been made recently to extend social insurance benefits to migrants living in the city, migrants are much less likely to have employment contracts and to have employers who are making mandated contributions to pension, health and disability insurance programs (Giles, Park and Wang, 2011).
[6]Additional descriptive statistics on sources of support from the 2005 one percent population subsample are reported in Cai et al (2011) and Giles, Wang and Zhao (2010).
[7]In defining "employment" in this paper, we include wage employment in the informal sector, casual work, self-employed activities and unpaid work in family run enterprises, all of which may be important for older workers in these economies. We focus on employment as opposed to labor force participation, per se, for two reasons. Job search is often not well-documented, and where it is (e.g., the CHARLS data for China) there are a vanishingly small number of respondents (five in CHARLS) over age 45 who are not employed but report active searches for work. We have no doubt that a search process exists for older workers who wish to work, but it is difficult to capture, and this is particularly true when large shares of older workers are self-employed.

Longitudinal Study (CHARLS) pilot conducted in 2008, we note 45 percent of urban men aged 60 to 64 were still employed at least one hour per week (Panel A), but in rural areas nearly 86 percent of men in this age range were still working. The difference in employment of urban and rural women aged 60 to 64 was even wider, with only 16 percent working in urban areas and nearly 57 percent still employed in rural areas.

If anything the CHARLS pilot, with relatively small sample sizes in urban Zhejiang and Gansu Provinces and representative of only two provinces, may overstate the employment rates of older men and women. Also presented in Panel A of Figure 1 are the 1991 and 2009 estimates from the China Health Nutrition Survey (CHNS), which show a substantially lower employment rate of 31 percent for urban men in the 60 to 64 age range. When comparing employment rates across the age distribution over time using the CHNS, one observes declines for both men and women in urban areas, but less pronounced declines in employment rates in rural areas.[8] Rural women between age 45 and 65 are somewhat less likely to be working in 2009 than in 1991, but this does not appear to be true for older women or for rural men.[9]

One of the sharper changes from 1991 to 2009, as viewed from the CHNS, lay in the decline in employment rates of women over age 45 in urban China. Reviewing representative evidence from census data (Figure A.1) this effect appears strongest among women from age 45 to 55, as the population census and one-percent sample suggest modest increases in the employment of women over 55. Examining further evidence from three waves of the China Urban Labor Survey (CULS), which allows one to carefully distinguish employment (under our definition) from labor force participation, it is clear that China's booming economy and a tight labor market has increased women's employment across the age distribution for women under 45, but that after 45 employment rates drop sharply (Figure A.2, Panel A). Moreover, when we turn to labor force participation (Figure A.2, Panel B) it is evident that in 2001 and 2005 many of the urban women

[8]We review evidence from the CHNS as it is the publicly available data source that researchers used (pre-CHARLS) to study labor supply, health status and retirement of older workers in China (e.g., Benjamin et al, 2003; Dong, 2011). As it is based on a panel of households which does not enumerate complete information on family members who have split off of households, one should be concerned that later waves of the CHNS over-represent those who remain in the households. As we are interested in the over-45 population, this is less of a problem than if we were considering the employment decisions of individuals who were children in 1991 and likely to have moved out of households.

[9]In Appendix Figure A.1, we present statistics from the 1990 and 2000 population census and the 2005 one percent population sample. Employment rates are somewhat lower in 2005 for older men and somewhat higher than one observes in the CHNS.

who were not employed were nonetheless looking for work and in the labor force, so that labor force participation rates were quite similar in 2001, 2005 and 2010 for women under 45. By 2010, however, the CULS suggests a sharper drop in labor force participation among urban women over age 45 than we observed in earlier years.[10]

The decline in older women's labor force participation raises an important question for labor research in China: Does the decline in women's employment reflect a resurgence of gender discrimination in post-reform China or the effects of increases in household wealth and the ability of women to exit the labor force at a younger age? Differences across genders in mandatory retirement ages likely creates an institutional bias against women's employment. Even in the absence of discrimination, the employment decision of older women in urban China reflects a constrained choice. Women may return to work as consultants or in self-employed activities after reaching mandatory retirement age, but retired women are frequently receiving pensions, which raises reservation wages for new employment. Those urban women uninterested in working in typical self-employed activities held by blue collar workers (e.g., nannies or housekeepers), may choose to stay out of work if their pension incomes are sufficient.

Earlier research on labor force participation in China has noted the drop in employment rates of urban residents, and urban women in particular (Cai et al, 2008; Maurer-Fazio et al, 2011) and attributed the drop to the effects of state sector restructuring after 1997. Restructuring reduced the state sector through two mechanisms: for younger state-sector workers, a special one-time urban layoff (*xiagang*) program provided up to three years of living subsidies (and continued pension and health insurance contributions), as well as training and job placement assistance through reemployment centers. Workers within five years of retirement age were encouraged to take early retirement with pension benefits. As women were much closer to retirement age than men, particularly blue collar workers facing retirement at age 50, a far higher share of women took early retirement than men.

After losing work during state sector restructuring, men, the young and the well-educated, generally faced a shorter duration out of work (Appleton et al, 2002; Giles et al, 2006a; Maurer-

[10]It should be remembered that the CULS sample used for these comparisons are representative samples from five large cities (Fuzhou, Shanghai, Shenyang, Wuhan and Xian), and may not be representative of work decisions in medium and small cities.

Fazio, 2007). Moreover, some researchers found that women's decision to reenter the workforce was affected not only by permanent and relatively generous pensions, but also by family circumstances (Giles et al 2006b).

Given support available through pensions to relatively young workers during economic restructuring and potential biases against hiring displaced workers relatively close to retirement age, one would expect to see sharp drops in employment of urban women from 1991 to 1997 and 2000, as is shown in Panel B of Figure 1. If reduced employment rates of urban women over 45 were simply the effect of restructuring in the late 1990s, however, we would expect that employment of women in the 45 to 55 age range would return to higher pre-1997 levels by 2009. The fact that older working age women, who have not yet reached mandatory retirement age, continue to have lower employment rates, even after labor markets tightened during the 2000s, raises the possibility that exits from the labor force may be a choice facilitated by higher wealth or by increasing demands on time for non-market activities, such as caring for children, elderly or other ill family members.

Exits from employment among older workers as they approach pension eligibility are not unusual in more developed economies such as the UK and the US, but exit rates in the years before retirement age are not typically as high as one observes in China. Figure 2 highlights differences in employment rates across five countries and shows that 68 and 70 percent of women age 50 to 54 are still employed in the US and UK, respectively. Employment rates of women in this age range are somewhat lower in urban Indonesia at 63 percent, but above the 38 and 30 percent employment rates witnessed in urban Korea and China, respectively.[11] Relative employment patterns of men in the 55 to 59 age range follow a similar pattern: 68 and 67 percent of urban men in this age range in China and Korea, respectively, are employed, while 82 percent of urban Indonesia men of this age are still working.

Mandatory Retirement Provisions and Retirement Patterns. Incentives created by gender differences in the mandatory retirement age may encourage early exits from the labor force for women, particularly for women who face the prospect of job search in their 40s. Career changes and job changes later in working life can be difficult in developed and developing economies

[11]Note that this is the urban employment rate for women using the CHARLS sample, in the CHNS sample the rate is higher at 42 percent.

alike. As beginning a new job requires learning processes, technology and culture of the new workplace, a new employee will not reach peak productivity in a position immediately upon being hired. An employer may be less likely to consider hiring a worker who is close to mandatory retirement age simply because there is not sufficient time to earn a return on initial training and start-up costs relative to a younger worker. In the US, where many workers start to leave the workforce upon eligibility for social security benefits, difficulties finding new employment among older displaced workers are well-documented. Research using the US Health and Retirement Study (US-HRS), for example, has demonstrated that of workers who lose jobs after age 55, only 60 and 55 percent of men and women are employed again within two years, while 80 percent of non-displaced workers are employed (Chan and Stevens, 2001).

In China, and to some extent Indonesia and Korea, a mandatory retirement age for some occupations and types of employers is even more binding than social security eligibility in the US. Differences in mandatory retirement ages of men and women in China may have a significant impact on how employers view the relative returns to hiring male and female employees who are in their 40s and older.[12]

In Korea and Indonesia, retirement ages are not mandated by the law, but employment laws allow for firms to set mandatory ages, and government employees and civil servants face mandatory retirement. Explicit rationales for mandatory retirement provisions and legal support for them in Korea is based recognition that firms have long promoted worker allegiance by paying employees below their marginal product early in their careers and rewarding them with a premium after significant tenure. As workers later in their careers earn significantly more than their reservation wages and thus have a disincentive to retire, mandatory retirement provisions implemented by firms and the government civil service provide a means of guaranteeing that less productive older workers will eventually leave the firm, and facilitate promotions for younger employees.[13] The Korean Supreme Court passed a ruling in 1978 which permitted employers to adopt a mandatory retirement age,[14] and firms have responded by setting 55 as the median mandatory retirement age, with some exemptions allowing later retirement for senior executives.

[12]Of course, employers may already perceive older workers to be less productive (Chan and Stevens, 2001; Dalen et al, 2010), but this is a problem faced by both older men and women when looking for work.

[13]Lazear (1979) presents a theoretical model which suggests that mandatory retirement solves an important agency problem by allowing firms to shed unproductive older workers.

[14]Ruling No. 78da 1046, 12 September 1978.

After the East Asian Financial Crisis in 1997/8, firms which had not implemented mandatory retirement started to do so as a way of slowing wage increases associated with seniority-based wage systems (Cho and Kim, 2005).

In Indonesia, government employees and civil servants face mandatory retirement at 55, and this age is followed by some large private employers as well (Brodjonegoro and Simanjuntak, 2002; Leechor, 1996). From 1995, the "normal retirement age" was considered to be 55 with a maximum age of 60, with these retirement ages applying to larger private sector employers as well as the government.[15] Apart from the "normal retirement age," however, there are numerous exceptions made through presidential and ministerial decrees, that raise the retirement ages for some occupations. Doctors and other high skilled professional civil servants may retire at 60, more senior levels of civil service are able to retire as late as 65 and university professors face mandatory retirement at age 70. Employees of smaller scale enterprises and the self-employed, who comprise the urban informal sector, do not face mandatory retirement.

The higher employment rates of older urban men and women in Indonesia and Korea (Figure 2) suggest that mandatory retirement from some occupations and types of employers does not mechanically lead to permanent exit from productive employment. Existing research on older workers in both countries suggests that an impending retirement creates incentives for forward-looking workers to leave employers preemptively, either to start their own businesses or to start second careers working for smaller private sector employers.[16]

One significant difference across workers in urban and rural areas of China, Indonesia and Korea lies in the share of the retirement age workforce with access to pensions. In China, evidence from China Health and Retirement Longitudinal Study (CHARLS) pilot suggests that, of urban residents over age 60, 79 and 54 percent of men and women, respectively, have access to pension

[15]Government Regulation No 32 (1979) specifies 55 as the retirement age for civil servants and became the benchmark for the "normal retirement age" followed in the private sector as well. Ministry of Labor Regulation No 2 (1995) stipulates that the normal retirement age is 55 and the maximum is 60, and these are also the ages at which eligible retirees are able to start collecting pensions.

[16]McKee (2006) finds that in Indonesia, half of government workers move into either the private sector or into self-employment, and 61 percent of workers who leave their private sector jobs move into self-employment. In Korea, self-employment was one response to lay-offs from larger employers in the wake of the 1997/8 financial crisis (Sohn, 2007), and continues to be an important source of employment for older males (Lee 2009). Lee and Lee (2011) note differences in the retirement ages of self-employed and wage-salary earners, but do not discuss the incentive to move into self-employment ahead of mandatory retirement among wage and salary earners who wish to continue working.

support. In urban areas of Indonesia and Korea, by contrast, fewer than 35 percent of men and 15 percent of women have access to pensions.[17] Another unique feature of pension eligibility in Korea lies with an imperfect correspondence between mandatory retirement age and age at which pension-eligible retirees may start receiving pension benefits. The National Pension scheme, the largest of the three main sources of pensions in Korea, does not begin paying benefits until age 60, yet a significant share of employees face mandatory retirement at age 55 (Cho and Kim, 2005). This imperfect correspondence likely increases incentives for those employees facing mandatory retirement to look for new career opportunities, including in the self-employed sector.

Across rural areas of China, Indonesia and Korea, both men and women remain actively employed until much later in their lives than urban residents. In rural areas of all three economies, agricultural production on the family farm continues to be a significant source of employment for older workers, and this is necessitated by the fact that rural residents tend to accumulate less wealth over their working lifetimes. In addition, older workers in rural China and Indonesia are far less likely to have access to pensions than their urban counterparts. Both the CHARLS and the 2005 Population Census suggest that, of rural residents over 60, roughly 5 percent of men and less than one percent of women have pension support. Similarly, in rural Indonesia, the Indonesia Family Life Survey (IFLS) shows that only 8 and 3 percent of men and women over 60 have access to pensions.

Rural Korea is a somewhat different matter. Efforts to bring rural residents into the National Pension scheme established in 1988 have led to pension coverage rates in rural areas that do not differ significantly from urban areas, indeed 34 percent of older rural men in the 2006 KLoSA wave report receiving pensions. Nonetheless the continued labor supply of rural men is viewed as an important factor contributing to high rates of economic activity among older Koreans (Lee 2009). In spite of availability of pensions, levels of support are not sufficient to permit retirement of the rural elderly. Lee (2009) suggests that the out-migration of the young has left elderly who remain behind with both a lack of young labor and insufficient wealth to cease productive

[17]More specifically, in Korea, 34 percent of urban men have access to pensions and 15 percent of urban women, and in Indonesia, 27 percent of urban men have access to pensions and 10 percent of urban women. Figures on pension coverage are drawn from the 2006 Wave of the Korean Longitudinal Study of Aging (KLoSA) and the 2007 wave of the Indonesia Family Life Survey (IFLS).

activity. Given that the history of rapid urbanization in Korea mirrors the process of rural to urban migration taking place in China, one might be concerned that incidence of delayed retirement of China's rural farmers, who are less affluent and have lacked pension support, may follow a similar pattern to Korea.

Phased or Gradual Retirement? The literature on retirement in developed countries has emphasized that retirement is often a gradual process: workers may reduce work hours at present employers, move to work arrangements requiring fewer hours per week or even transition in and out of retirement.[18] Using the US Health and Retirement Study (HRS), Gustman and Steinmeier (2000) find that twenty-two percent of the population reported being partially retired at some point, and that a fifth of the population had partially retired by age 65. Exits from employment, or the labor force, are also not always permanent: Gustman and Steinmeier's study finds that over four waves, 17 percent of the sample experienced a reversal in which they moved from less-intensive work to more work.

The particular set of incentives influencing the labor supply decision of older workers in urban China, both before and after reaching mandatory retirement age, are likely to lead to similar patterns of gradual retirement as observed in other countries. In urban areas, low unemployment rates and shortages of skilled labor in a rapidly growing economy offer opportunity for older skilled workers. On the other hand, older long-term urban residents who own residences have experienced a sharp increase in their wealth over the last decade (Park and Porter, 2011), which may raise reservation wages and reduce the likelihood of returning to work.

In order to gain a sense of the importance of gradual, or phased retirement, we show average hours of work per week across the age distribution in Figure 3 below. The first panel shows average work hours unconditional on work status, with the labor hours of respondents who are not working equal to zero. In panel B, average hours are reported only for those respondents who

[18]Gustman and Steinmeier (1984) found that self-reports of partial retirement among US men aged 58 to 69 was quite common, particularly partial retirement into a job different than the one held at age 55. Blau (1994) emphasizes that older workers transition in and out the labor force ("retirement") with considerable frequency and that these transitions are often not picked up in annual data.

are working.[19] We use the CHNS to contrast average work hours in 1991 with 2009, and also include data from the 2008 CHARLS pilot.

From the unconditional plots in Panel A of Figure 3, a gradual reduction in average work hours after age 45 is apparent for both men and women in urban areas. Also evident is a steeper decline in work hours for women between 45 and 55 and for men between 55 and 65. Turning our attention to Panel B, a gradual decline in work hours is evident for men and women who continue working beyond age 55, but it is not steep. By 2009, urban men between 55 and 60 who are employed, report spending an average of 45 hours per week working. By age 70, urban men who continue in productive employment are spending just 20 to 30 hours per week employed while their employed rural counterparts of the same age are still working more than 40 hours per week. The difference across urban and rural areas in the work-intensity of those working beyond mandatory retirement age suggests that urban residents may have the ability to retire gradually, while rural residents, if they have the physical capacity, may indeed continue to work full-time into their 70s.[20]

When comparing work-intensity of older workers across countries, it is evident that China's residents over 60 work fewer hours than their respective urban and rural counterparts in Indonesia and Korea (Figure 4). Conditional on working, average working hours for urban men and women (Figure 4, Panel B) are more similar to the UK, where hours drop off more quickly with age, than for Indonesia, Korea and the USA.

Retirement in China, Indonesia and Korea

The descriptive patterns shown above make use of data from early stages of longitudinal studies from China and Korea which are modeled on the Health and Retirement Study (HRS) from the US and the English Longitudinal Study on Aging (UK). New survey efforts, like CHARLS in China, promise to facilitate the study of retirement and labor supply behavior in regions where pension and social security systems are not well established, and population aging is occurring at a rapid pace. In the analytical models that we estimate, we make use of the cross-sections from

[19] As earlier, we use non-parametric locally weighted regression (LOWESS) to smooth the averages across the age distribution.

[20] This has long been true of China's rural elderly. A classic study of the rural elderly in the 60s and 70s referred to their lives as one of "ceaseless toil" (Davis-Friedman, 1991), and Pang et al (2004) characterize the retirement decision in rural China as "working until dropping."

China, Indonesia and Korea used for basic descriptive statistics presented above. Summary statistics for important variables used in the analysis can be found in Table 1. Below, we provide some additional discussion of the analysis sample used for each country:

China. The China Health and Retirement Longitudinal Study (CHARLS), directed by Yaohui Zhao at the National School of Development at Peking University, was developed and implemented by an accomplished team of collaborators from China and abroad. The sample used in this analysis is from the pilot survey conducted in 2008 in Gansu and Zhejiang provinces, and is representative of adults over 45 years of age in these provinces. Gansu, in the Northwest is a relatively poor province and Zhejiang, on the coast south of Shanghai, is relatively affluent. CHARLS follows the model of the HRS, ELSA and KLoSA in the US, UK and Korea, and enumerates information on respondent and spouse socio-economic status, health conditions, work and employment, incomes and pensions, and also includes household and community level information. In the pilot sample used in the analysis below, there are 1570 households and 2685 eligible respondents.[21]

Indonesia. The Indonesian Family Life Survey (IFLS) is an ongoing project conducted by RAND Corporation and universities in both Indonesia and the US. To date, four waves have been conducted in 1993, 1997/98, 2000, and 2007/08. The survey covers individuals, households, communities, and the community-level health and educational facilities that respondent households access in their daily life. While it is not a formal member of the "HRS family" of aging surveys, the data are comprehensive and include information on respondent health status, employment and labor allocation, pension participation and household and family characteristics, all of which are crucial for study of retirement and labor supply decisions of the elderly. The original survey was representative of 83% of the Indonesian population and 13 of 27 provinces. As it tracks the movers and split-offs from the original sample, the IFLS was a pioneer among household surveys in the developing world. Tracking is important when working with the 2007/8 round of the IFLS, because it allows us to avoid using a selected sample of

[21]The CHARLS project has funding for nationally representative surveys in 2011 and 2013, and fieldwork on the first national wave will begin in July 2011. Public use data should be available for the research community by June 2012.

individuals who have not moved.[22] The most recent round has 50583 observations and 13507 households. The analytical work below uses detailed information collected from 7283 direct respondents aged 45 and over for whom information on pension eligibility was enumerated.

Korea. The Korean Longitudinal Study of Aging (KLoSA) is a nationally representative survey conducted by the Korea Labor Institute to investigate the overall conditions of people aged 45 or older in South Korea (Excluding Jeju island). KLoSA belongs to the same family of aging surveys as CHARLS, HRS and ELSA. The first baseline survey was conducted at 2006, and it was followed by a job history survey in 2007. While KLoSA is a longitudinal survey, only the baseline survey is publically available. In common with CHARLS and ELSA, but differing from the HRS, the first baseline survey doesn't cover the institutionalized elderly. Overall, 6171 households and 10254 individuals participated in the baseline survey, and there are 10030 observations with complete information.

A Model of the Employment of Older Adults

Below, we examine determinants of the labor supply (employment) of older workers, recognizing that important correlates, such as access to pensions, may be systematically related to both the ability to retire and unobservable characteristics (e.g., ability). While these models should be viewed as providing descriptive evidence, we choose measures of health status, and proxies for wealth and family characteristics with the aim of minimizing endogeneity biases.

As a framework for understanding the "retirement" and labor supply decisions of the elderly, assume that individuals (or households) maximize utility subject to a family budget constraint, which is a function of wealth, income, available time, health status and non-labor income of household members. From the constrained utility maximization decision, we conceptualize a general model of labor supply:

$$L_i^S = f(W_i^h, I_i^w, I_i^{nw}, H_i, T_i, \mathbf{X}_i, \mathbf{V}_j) \quad (1)$$

[22]Even though older residents of both this survey, as well as the CHNS in China, do not move or split off with the same frequency as household members who were under 25 during the initial wave, one might nonetheless be concerned about this potential source of bias.

where labor supply (or employment) of individual i, L_i^S, is a function of household wealth, W_i^h, income from work of all household members, I_i^w, income unrelated to current work, I_i^{nw}, health status, H_i, an individual's time endowment, T_i, a vector of individual and household characteristics reflecting preferences, $\mathbf{X}_i$ which include own age and demographic characteristics of household members. Given likely variation in opportunities and returns to labor across geographic regions (Jalan and Ravallion, 2002), we control for potential unobserved county-level characteristics affecting labor supply with a vector of county (or city) level indicators, $\mathbf{V}_j$. Identifying effects of each of these variables are complicated by three factors which introduce bias into our estimates: some are imperfectly observed, there are functional relationships among important variables (e.g., health status may affect income through productivity, available time, and available household wealth), and labor supply of an elderly individual may be simultaneously determined with the labor supply decisions of other family members, particularly a spouse. In order to reduce such bias, we estimate reduced form models with proxies for longer-term determinants of (permanent) income and wealth.

First, we use housing wealth as one proxy for household wealth (W_i^h). Unlike liquid components of wealth, housing wealth will vary less with current shocks to both income and health that simultaneously determine labor supply.[23] Second, current labor income (I_i^w) of a household will also be systematically related to own and family member labor supply decisions. Recognizing that educational attainment of the elderly themselves is likely to be associated with lifetime earnings and accumulated wealth of the household, we include the respondents' own educational attainment as an additional proxy for wealth. In addition, the average educational attainment of a spouse and adult children are usd as a proxy for both the value of a spouse's labor and the value of potential support from adult children (whether or not they are in the household).

Health status also affects productivity and ability to earn income through its impact on capacity for work. Elderly who are ill or suffer physical limitations may be unable to provide much labor for farm activities, and so we make use of self-assessments of ability to perform activities of daily living (ADLs) as proxies for health status. In sum, our complete set of proxies for W_i^h, I_i^w

[23]Venti and Wise (2004) show that housing wealth is not treated as a liquid asset in the US.

and H_i in the reduced form are quadratics in educational attainment and age, measures of health status of the respondent (ADL z-scores, described below), and the average educational attainment of a spouse and adult children of the household. As some older workers may find that their time is best utilized in provision of care to relatives and that this may influence employment decisions, we also include numbers of grandchildren and living parents, respectively, of the household head and spouse.

The three data sources used to examine employment outcomes in China (CHARLS 2008), Indonesia (IFLS 2007) and Korea (KLOSA 2006) provide roughly comparable information on labor supply, health status and education of both the respondent and spouse, and information on parents and children regardless of current residence in the household.[24] We estimate the reduced form labor supply model in each country:

$$L_i^S = \beta_1 E_i + \beta_2 E_i^2 + \beta_3 Pen_i + \beta_4 Pen_{-i} + \mathbf{ADL}_i'\boldsymbol{\beta}_5 + \beta_6 \overline{E}_{-i} + \mathbf{X}_i'\boldsymbol{\gamma} + \mathbf{V}_j + u_i \qquad (2)$$

where labor supply, L_i^S, is a binary indicator of whether individual i worked for one hour or more during the previous week. We expect that higher values of educational attainment of elderly, E_i, will be associated with higher wealth and savings and, as leisure is a normal good, may be negatively related to elderly labor supply.[25] Similarly, we expect that access to own pension income, Pen_i, and pension income of a spouse, Pen_{-i}, will be negatively related to employment.

The health of older workers and elderly are measured using two z-scores calculated from responses to a set of activities of daily living questions, $\mathbf{ADL}_i$.[26] For each of the three data

[24] An important benefit of knowing the numbers of grandchildren and living parents independent of whether they are members of the household is that we are able to control for potential demand for a family care-provider without introducing biases related to endogenous household composition, as would occur if relying on information about household members alone.

[25] Of course, an individual with more education may also be able to earn significantly higher returns, and so the coefficient on education will reflect the net effect of returns and accumulated wealth on employment.

[26] Bound (1991) cautions that general health status questions are likely to be correlated with unobservable individual characteristics, and further, that they may suffer from justification bias. Several studies (e.g. Bound, 1999; Dwyer and Mitchell, 1999) have suggested that proxies constructed from ADLs do not suffer from such serious bias. Bound et al (2010) cautions that financial wealth may affect ADL outcomes, and that even proxies developed from ADLs may lead us to underestimate the negative effects of poor health on labor supply. As we do

sources, we make use of questions related to activities of daily living to construct two indices: one is based on the number of activities that the respondent may perform with difficulty (Difficulty), and the second is based on the number of activities that a respondent cannot perform (Unable). Because each survey has some differences in activities and asks a different number of activities, we use these responses to construct within country z-scores (respondent count – average count)/(standard deviation of count).[27] Increases in each of these two z-scores reflect declining physical ability and worsening general health status. A particular value of the Unable-ADL z-score will be associated with more severe limitations than the same value of the Difficulty-ADL z-score.

We expect that declining health will have a negative impact on work activity, particularly for those workers in occupations in which physical strength and mobility are important (Bound, 1999). As the education of a spouse or adult children will be related to additional sources of income (from spouse income or transfers from children), we include average education of these family members, $\overline{E}_{-i}$. Finally, we control for a vector of individual and household characteristics, $\mathbf{X}_i$, which include age and age-squared and are associated with own productivity, numbers of grandchildren and living parents of the head and spouse, which are associated with preferences for employment, and the ln(1+per capita value of the household dwelling), as a proxy for household wealth.

Within the retirement literature in the US, recent research has focused on the important roles of spouse employment and spouse health status in labor supply and retirement decisions. First, the retirement decisions of husbands and wives may be interdependent. Structural models (Blau, 1996; Gustman and Steinmeier, 2004) suggest that labor supply decisions of older couples reflect preferences for shared retirement. Second, work decisions may be affected by the health status of a spouse. One may plausibly observe an added worker effect, in which a spouse's health shock leads to increased labor supply so as to insure income against the earnings-loss associated with the health shock (e.g., Coile, 2004a), or alternatively find that spouse care requirements will

not yet have appropriate panel data for the three countries in this study, we are not able to control for dynamic relationships between health and wealth.

[27]CHARLS asks 19, IFLS asks 18 and KLoSa asks 17. Each of the surveys asks questions related to functional abilities such as: ability to walk for a kilometer, ability to go up and down stairs, difficulties lifting 10 or 20 lbs, draw water from a well, ability to perform household chores, bath oneself or take medication.

require exit from the labor force (e.g., McGeary, 2009). To gauge the potential importance of these factors in China, Indonesia and Korea we next estimate model (3) below:

$$L_i^S = \beta_1 E_i + \beta_2 E_i^2 + \beta_3 Pen_i + \beta_4 Pen_{-i} + \mathbf{ADL}_i'\boldsymbol{\beta}_5 + \beta_6 \overline{E}_{-i} + \mathbf{ADL}_{-i}'\boldsymbol{\beta}_7 + \beta_8 L_{-i}^S + \mathbf{X}_i'\boldsymbol{\gamma} + \mathbf{V}_j + u_i \quad (3)$$

where L_{-i}^S is an indicator or whether or not a spouse is employed, and $\mathbf{ADL}_{-i}$ are measures of spouse health status. As the labor supply decisions of husbands and wives are likely to be determined jointly and have a dynamic relationship with health and shocks to health and employment, we view these models as purely descriptive but informative of the extent to which joint labor supply decisions may affect the timing of retirement. As the HRS-type surveys mature into full panel studies, it will be feasible to control for unobservables and to unlock directions of causality among these variables.[28]

Determinants of "Retirement" in China, Indonesia and Korea

***Employment and Pension Availability*.** Descriptive patterns of employment in productive activity across urban and rural areas of China, Indonesia and Korea (Figure 5) are suggestive of the role that eligibility for a pension may play in retirement of older workers and elderly. In these figures, the line shows the share of population in two-year age cohorts that is employed in some productive activity (salaried work, informal sector wage labor, casual work, self-employed activities or unpaid employment in family-run enterprises) and the bars represent the pension eligible share. In urban China, the employed share decreases sharply with increases in the pension-eligible share. In rural areas of China, one does not observe a similar decline in employment, and shares of workers with access to pensions are quite low. In Indonesia and Korea, where pension coverage rates at young ages are lower than for urban China, one observes

[28] In estimating (2) and (3), it should be noted that for each country there are subsamples of the population for which there is no spouse or for which spouse information is not available, and this may lead us to concerns about biases introduced by selection into marriage. In the models presented in this paper, we have handled this problem by including indicator variables for marital status and for absence of spouse information, and then set spouse information to zero for those observations in which no data on a spouse are available (for ADL z-scores, of course, this corresponds to the mean). We have also estimated these models on the subset of the data for which we have information on both spouses. We take comfort in the fact that there is no appreciable difference in the coefficients of interest across models using the full sample and the one estimated on married couples with spouse information.

a much more gradual decline in the employment of men in urban areas, and a far less pronounced decline in rural areas of both countries.

In Table 2, below, we show results from estimating the labor supply model presented in specification (2) above.[29] The results are suggestive of the role that pension income plays in decisions to exit from employment and the labor force. After controlling for age, education, health status of respondent and spouse, proxies for wealth and family demographic characteristics, men and women in urban China are 15.2 and 18.3 percent less likely to be working if eligible for a pension. Among the rural population, we observe a marginally significant negative relationship between pension eligibility and employment for men, but no effect on employment of women. In Indonesia, where coverage by pensions is most common among retired civil servants, access to pensions is also negatively associated with work activity for both genders in rural and urban areas. In Korea, by contrast, access to a pension only affects the employment status of men in urban areas. This may not be surprising if pension coverage or income is particularly low in Korea, or is earned by wealthier households whose labor force participation is affected by other factors. Lee (2009) has noted that although coverage expansion to rural areas was an objective of the National Pension Scheme after 1988, wealth distribution in rural areas remains skewed and that the majority of rural households lacked sufficient pension income or wealth to retire.

Ability to retire, of course, not only depends on pension access, but on whether a household has sufficient accumulated wealth to allow for retirement. A respondent's years of schooling will be associated both with lifetime wealth, and with potential current returns available in the labor market. In the models reported in Table 2, we observe a non-linear relationship between years of education for urban and rural women and their probability of working. For urban Chinese women, probability of working declines with each additional year of schooling through completion of middle school, and then starts to increase with higher levels of education. We also observe that increases in housing wealth per capita in urban China are associated with reduced probability of employment. In rural China, the probability of male and female employment declines with education through eleven years of schooling. As educational attainment is not very

[29]We present linear probability models by gender and residence location (urban and rural). While magnitudes differ somewhat, marginal effects using probit models do not lead to significant qualitative differences in results.

high in rural China, increasing education (and lifetime accumulated wealth) is associated with reduced likelihood of employment for all but those individuals who have completed high school. The more highly educated rural women are likely to be working in village administration, run small enterprises or be involved in other activities that have higher returns and do not require the same physical demands as work in agriculture. Turning to Indonesia and Korea, we only observe a similarly strong negative relationship between years of schooling and participation in work among women in urban Indonesia.

The pension income of a spouse, as well as other incentives affecting spouse retirement decisions, may also influence the retirement decision (Coile, 2004b). In the results shown in Table 2, we find that spouse pension eligibility has a significant impact on the employment status of rural women. A rural woman married to someone with a pension is likely to be in a much wealthier household. Pension recipients in rural areas tend to be retired cadres with much greater lifetime savings. Lack of an effect of spouse pension eligibility on employment of women in urban China likely reflects the fact that urban women, who are five to ten years younger than their spouses, are frequently pension eligible and already out of the labor force. A husband's pension eligibility does not have an independent effect on labor supply.

Work and Health Status. For those workers in developing countries involved in manual tasks, such as work in agriculture, we would expect to observe a strong relationship between health status and labor force participation. From the results shown in Table 2, health status has a far more pronounced effect on work activities of China's rural residents than urban residents. A one standard deviation increase in the Difficulty-ADL z-score is associated with 7.5 and 7.2 percent decline in probabilities of working for rural men and women, respectively, and a one standard deviation increase in the ADL-Unable z-score is associated with 8.0 and 5.0 percent reductions for men and women. In contrast to China, decline in physical functioning has a negative effect on work status of men and women in both urban and rural areas of Indonesia. Given that urban residents of Indonesia tend to work until much later in their lives, frequently in self-employed activities, the difference in importance of health status between urban residents of China and Indonesia makes sense. China's urban residents retire before marked declines in physical functioning. Finally, in Korea, poor health status has a statistically significant negative effect on

employment of men in both urban and rural areas, but the effect is more pronounced in rural areas where work is likely to be more strenuous.

Family Care Provision and Employment? One frequently raised hypothesis concerning the exit of older women from the labor force lies with growing demands for provision of elder care and care of grandchildren. In order to reduce potential bias, the models estimated in Table 2 use numbers of living parents and grandchildren, respectively, rather than presence of parents or grandchildren as *household* members as covariates. This distinction is important as a significant negative correlation when an elder is present in the household may lead to misleading causal interpretations if arrangements for care-provision and older worker labor supply are jointly determined.[30] The lack of a systematic negative relationship between employment of China's older urban workers and the number of family members for whom they might provide care, suggests that the explanation for decline in women's labor force participation lies elsewhere. In Indonesia and Korea as well, the composition of the extended family does not seem to be strongly and systematically associated with labor supply and retirement decisions.

Interdependence of Spouse Retirement Decisions. In Table 3 below, we present results from estimates of model (3), which provide insight into the joint retirement decisions of spouses and the role of spouse health status in retirement. Across rural and urban areas of China, Indonesia and Korea, men are more likely to work if their spouses are working as well. In urban China, where the effect of a spouse working is associated with a 19.6 and 20.2 percent higher probability of employment for men and women, respectively, one policy implication of joint retirement decisions is that efforts to encourage retirement at older ages for both men and women will likely have a positive impact on employment of spouses (Falkinger et al, 1996). Moreover, in rural China and both urban and rural areas of Indonesia, we find that a woman's employment is more strongly correlated with spouse work status than men's. In part, this reflects the youth of wives relative to their husbands and the likelihood that women will choose to retire at roughly the same time as their older husbands when there are (effectively) no gender differences in mandatory retirement and pension eligibility ages. In Korea, we observe a positive correlation

[30]Research using census data, which is unable to control for endogeneity of household composition, provides weak evidence that eldercare and childcare may explain a small share of women's exits from the labor force (Maurer-Fazio et al, 2011). Giles et al (2006b) find that urban women are more likely to work if they have a college-age adult child, which may reflect a labor supply response the sharp increase in post-secondary tuitions after 1996.

between employment of men and the work status of wives in urban areas, but a strong and roughly equal positive association between the employment of husbands and wives in rural Korea, which likely reflects joint decisions to retire from farming among older rural Koreans.

Employment and Spouse Health Status. Inclusion of Spouse Difficulty-ADL and Spouse Unable-ADL z-scores among covariates in model (3), and presented in Table 3, allow us to shed light on the relationship between spouse health status and respondent work decisions. Similar to the relationship with own health status, we find no correlation between spouse health status and employment in urban China. In rural China, by contrast, increases in the number of functions that a spouse has difficulty performing (Spouse Difficulty-ADL z-score) are positively associated with labor supply, suggesting an added worker effect dominates. A one standard deviation increase in the Spouse Difficulty-ADL z-score is associated with 3.1 and 5.2 percent increases that men and women, respectively, will be employed. The gender difference in the added worker effect, evident in rural areas of China and Indonesia, stands in contrast to the results using data from the US Health and Retirement Study, which suggest that shocks to health of a spouse have a small positive effect on labor force participation of men and no effect on women (Coile, 2004). While results for the US can be interpreted as suggesting that there is little opportunity to smooth income loss associated with health shocks through the labor market (as Coile concludes), the employment response for both genders in in rural China and men in rural Indonesia likely reflects both a stronger need to smooth income and fewer constraints to returning to work on the family farm than when looking for formal wage work.

Conclusions

As in other regions of the developing and developed world, population aging in China raises the prospect that both formal and informal mechanisms for supporting the elderly will come under strain over the next twenty years. In common with Indonesia and other developing countries, however, China is experiencing population aging at lower income levels and prior to the extension of pensions to rural residents and to urban residents in the informal sector. In a sense, China has two retirement systems: a *formal* system, under which urban employees receive generous pensions and face mandatory retirement by 60, and an *informal* system, under which rural residents and individuals in the urban informal sector rely on family support in old age and have much longer working lives. The retirement patterns presented in this paper illuminate the

employment context for the decisions that China's policymakers are currently facing as they work to extend new pension programs in rural areas and to the urban informal sector. Several issues warrant consideration when thinking about employment-related policy for an aging population.

First, as researchers have found in the US, the UK and OECD economies, we observe a strong association between pension eligibility and exit from productive employment in China, Indonesia and Korea. Moreover, in rural areas of China and Indonesia, where work is physically demanding, we observe a strong correlation between employment status and physical functioning abilities. In China, this raises concerns that the "ceaseless toil" characterization of rural elderly lives (Davis-Friedman, 1991) may remain accurate for a significant share of the rural elderly population. China's government has taken steps recently to improve pension support for the elderly. In 2009, a Rural Pension Pilot scheme was rolled out and current plans are to extend it to all counties before the end of the 12th Five Year Plan in 2012. The New Rural Pension Plan is a contributory plan with matched public contributions. Participants are eligible to receive the pension at age 60 with 15 years of contributions (or an equivalent buy-in).[31] Receiving pensions from these sources would not contain a mandate that the recipient stopped working, but the income would facilitate reduced work, whether complete or gradual.

Second, the gender disparity in mandatory retirement and pension eligibility ages for formal sector workers creates strong incentives for women to exit productive work at younger ages. While labor force participation rates of women are similar to those of men at younger ages, they fall precipitously after age 40. The evidence presented and reviewed in this paper suggests that the probability an urban woman is employed is strongly related to pension eligibility, which also corresponds to working for an employer enforcing mandatory retirement. Changing the age of pension eligibility rapidly may cause hardship for those women who are close to the current retirement age and want to retire, but allowing women to retire at the same age as their male counterparts would remove an obstacle that women face relative to men when looking for work later in life. In Indonesia and Korea, where there is no difference in mandatory retirement ages for men and women in the civil service or formal sector, women's labor force participation also

[31]To cover the urban informal sector (the self-employed and workers whose employers are not participating in employer-based programs) a New Urban Residents Pension Scheme was announced in June 2011, with roll out of pilots beginning in July 2011.

declines after 45, but these declines are not nearly as steep as those observed for urban Chinese women.

Apart from the disparity between mandatory retirement age for men and women from government and formal sector employers, retirement ages are quite low for those with formal sector employment in urban China. Given the rate of population aging, the argument that mandatory retirement is important for providing opportunities for younger workers makes less sense.[32] Indeed both macroeconomic and fiscal considerations warrant encouraging workers to remain employed until older ages. As noted above, eliminating (or raising) mandatory retirement ages will be less problematic than increases in the age of pension eligibility, but both are likely to be unpopular because they force changes in expectations and long-term planning. One politically palatable approach may be to gradually raise the retirement age in three month increments. Were such a reform started during the 12th Five Year Plan period, the retirement age for men would reach 65 by 2030, though it would take longer at this pace for full equalization for women. Research conducted in the US and Europe, however, suggest that one might provide incentives within the pension system to encourage retirement later in life.[33] Moreover, correlations in retirement of spouses, reflecting coordination of retirement planning, raises the prospect that eliminating disincentives for women to remain in the labor force after 50 may encourage delayed retirement of their husbands as well.[34]

Among older residents who work, the paper has shown that reductions in work hours are quite gradual. A key area of employment experimentation in OECD countries is through introduction of flexible work arrangements, accompanied by removal of mandatory retirement ages and promotion of "job-sharing," which has received positive reviews as a component of labor market

[32]Gruber and Wise (2010) raise questions as to whether older and younger workers are substitutes, and the extent to which raising retirement ages could limit opportunities for new entrants into the workforce.

[33]Coile and Gruber (2007) find that changes in expected social security benefits in the US have an impact on retirement planning well ahead of retirement. Gustman and Steinmeier (2009) and Vere (2011) find that changes in social security rules or benefits help to increase the labor force participation of older workers, and may even lead to increases in hours worked "after retirement" in one's 70s. Robalino et al (2009) suggest that changes to social insurance policies in Brazil could have an important impact on the labor supply and retirement decisions of older workers.

[34]Falkinger et al (1996) find that increasing the retirement age of women through social security reforms may lead to longer working lives for men as well.

reforms in Germany. China could benefit from assessment of international lessons and expansion of pilots domestically in these areas.[35]

While this study has focused primarily on the relationship between pension eligibility, mandatory retirement and work activity, the positive relationship in urban China between educational attainment and continued employment at the high end of the education distribution (for those with more than high school education) reflects the possibility that workers with more skills, or ability to learn new skills, may find it easier to work at older ages. In a review of policies followed in Europe, the OECD has recognized this phenomenon and noted that support for skills upgrading at mid-career can be attractive for employers and employees alike, and may help to enhance the skills and employability of workers later in their careers as well.

References

Appleton S, Knight J, Song L and Xia Q (2002) Labor retrenchment in China: Determinants and Consequences." *China Economic Review*. 13:252-275.

Benjamin, D, Brandt, L and Fan, J (2003) Health and labor supply of the elderly in rural China, unpublished manuscript, Department of Economics, University of Toronto.

Blau DM (1994) Labor force dynamics of older men. Econometrica 62: 117-156.

Brodjonegoro B, Simanjuntak R (2002) Pension plan in Indonesia: Avenues for reform, Hitotsubashi Journal of Economics 43: 151-161.

Bound, J (1991) Self-Reported versus objective measures of health in retirement models, Journal of Human Resources 26(1): 106-38.

Bound J, Stinebrickner T, Waidmann T (2010) Health, economic resources and the work decisions of older men, Journal of Econometrics 156(1): 106-129.

Bound J, (1999) The dynamic effect of health on labor force transition of older workers, Labor Economics 6: 179-202.

Cai F, Park, A and Zhao, Y (2008) The Chinese Labor Market in the Reform Era in China's Great Economic Transformation, Brandt L and Rawski T (eds) Cambridge: Cambridge University Press.

[35] OECD (2006) provides a useful review of policies and approaches to reducing barriers and disincentives to continue working.

Cai F, Giles J, O'Keefe P and Wang D (2011) *Old-Age Support in Rural China: Challenges and Prospects , Directions in Development* Monograph, the World Bank.

Chan S, Stevens AH (2001) Job loss and employment patterns of older workers, Journal of Labor Economics 19: 484-521.

Cho JM, Kim SW (2005) On using mandatory retirement to reduce workforce in Korea, International Economic Journal 19: 283-303.

Coile, CC (2004a) Health shocks and couples' labor supply decisions, NBER Working Paper 10810, October 2004.

Coile, CC (2004b) Retirement incentives and couples' retirement decisions, Topics in Economic Analysis and Policy, 4(1): 1-28.

Coile, CC and Gruber, J (2007) Future social security entitlements and the retirement decision, The Review of Economics and Statistics, 89(2): 234-246.

Dalen HPV, Henkens K, Joop S (2010) Productivity of older workers: perceptions of employers and employees, Population and Development Review 36: 309-330

Davis-Friedman, D (1991) Long Lives: Chinese Elderly and the Communist Revolution, Expanded edition, Stanford, CA: Stanford University Press (1991)

Dong, Xiaoyuan (2010) Parental care and married women's labor supply in urban China, Feminist Economics, 16(3): 169-192.

Dwyer DS, Mitchell OS (1999) Health problems as determinants of retirement, Journal of Health Economics 18: 173-193.

Falkinger J, Winter-Ebmer R, Zweimuller J (1996) Retirement of spouses and social security reform, European Economic Review 40: 449-472.

Giles J, Park A and Wang D (2011) Social insurance coverage in China: Evaluating evidence from administrative data and urban household surveys, mimeo, The World Bank.

Giles J, Wang D and Zhao C (2010) Can China's rural elderly count on support from adult children? Implications of rural to urban migration, Journal of Population Ageing 3(3): 183-204.

Giles J, Park A and Cai F (2006a) How has economic restructuring affected China's urban workers? China Quarterly 185 (March 2006): 61-95.

Giles J, Park A and Cai F (2006b) Reemployment of dislocated workers in urban China: The roles of information and incentives, Journal of Comparative Economics 34(3) (September 2006): 582-607.

Gruber, J and Wise, D (1999) *Social security and retirement around the world*, Chicago: University of Chicago Press.

Gruber, J and Wise, D (2004) *Social security programs and retirement around the world: Micro-estimation*. Chicago: University of Chicago Press.

Gruber, J and Wise, D (2010) *Social security programs and retirement around the world: The relation to youth employment*. Chicago: University of Chicago Press.

Gustman AL, Steinmeier TL (1984) Partial retirement and the analysis of retirement behavior, Industrial and Labor Relations Review 37: 403-415.

Gustman, AL, Steinmeier TL (2000) Retirement outcomes in the Health and Retirement Study, Social Security Bulletin 63: 57-71.

Gustman AL, Steinmeier TL (2004) Social security, pensions and retirement behavior within the family. Journal of Applied Econometrics 19: 723-737.

Gustman AL, Steinmeier TL (2009) How changes in social security affect retirement trends? Research on Aging 31: 261-290.

Jalan J and Ravallion M (2002) Geographic poverty traps? A micro model of consumption growth in rural China, Journal of Applied Econometrics 17(4): 329-346.

Kanbur, R Zhang, X (1999) Which regional inequality? The evolution of rural-urban and inland-coastal inequality in China from 1983 to 1995, Journal of Comparative Economics, 27(4): 686-701.

Kinsella, Kevin and Wan He (2009) *An Aging World: 2008*, US Census Bureau, International Population Reports, PS95/09-1, Washington D.C.: US Government Printing Office.

Kreuger, AB and Pischke, J (1992) The effect of social security on labor supply: A cohort analysis of the notch generation. Journal of Labor Economics 10: 412-437.

Lazear EP (1979) Why is there mandatory retirement? The Journal of Political Economy 87: 1261-1284.

Lee C (2009) Labor force participation of older males in Korea: 1955-2005, NBER Working Paper Series 14800, Cambridge, MA.

Lee C and Lee J (2011) Employment status, quality of matching and retirement in Korea: Evidence from the Korean Longitudinal Study of Aging, Rand Working Paper Series WR-834.

Lee R and Mason A (2011) *Population Aging and the Generational Economy: A Global Perspective*, Abingdon, Oxon, UK: Edward Elgar Publishing.

Leechor C (1996) Reforming Indonesia's Pension System, Policy Research Working Paper 1677, World Bank, Washington, D.C.

Maurer-Fazio M (2007) The role of education in determining labor market outcomes in urban China, in *Education and Reform in China* Hannum E and Park A eds. London and New York: Routledge: 260-275.

Maurer-Fazio M, Connelly R, Chen L and Tang L (2011) Childcare, Eldercare, and Labor Force Participation of Married Women in Urban China, 1982-2000. *Journal of Human Resources*, 46(2): 261-94.

McGeary K (2009) How do health shocks influence retirement decisions? Review of Economics of the Household 7: 307-321.

McKee D (2006) Forward thinking and family support: explaining retirement and old age labor supply in Indonesia, Working paper 005-06. CCPR, UCLA.

National Bureau of Statistics (2001) "Communiqué of the National Bureau of Statistics of People's Republic of China on Major Figures of the 2010 Population Census (No. 1)" (http://www.stats.gov.cn/english/newsandcomingevents/t20110428_402722244.htm) National Bureau of Statistics of China, Beijing.

OECD (2006) *Live Longer, Work Longer*, Paris: OECD Publishing.

Pang, L, de Brauw, A and Rozelle, S (2004) "Working until you drop: The elderly of rural China," China Journal 52: 73-96.

Park, A and Porter, M (2011) Housing windfalls and intergenerational transfers in China, Paper presented at the Annual Meetings of the Royal Economics Society, April 2011.

Ravallion, M and Chen, S (2007) "China's (Uneven) Progress Against Poverty," Journal of Development Economics, 82(1) (January 2007): 1-42.

Robalino DA, Zylberstajn E, Zylberstajn H, Afonso LE (2009) Ex ante methods to assess the impact of social insurance policies on labor supply with an application to Brazil, World Bank Social Protection Discussion Paper No 0929, Washington D.C.

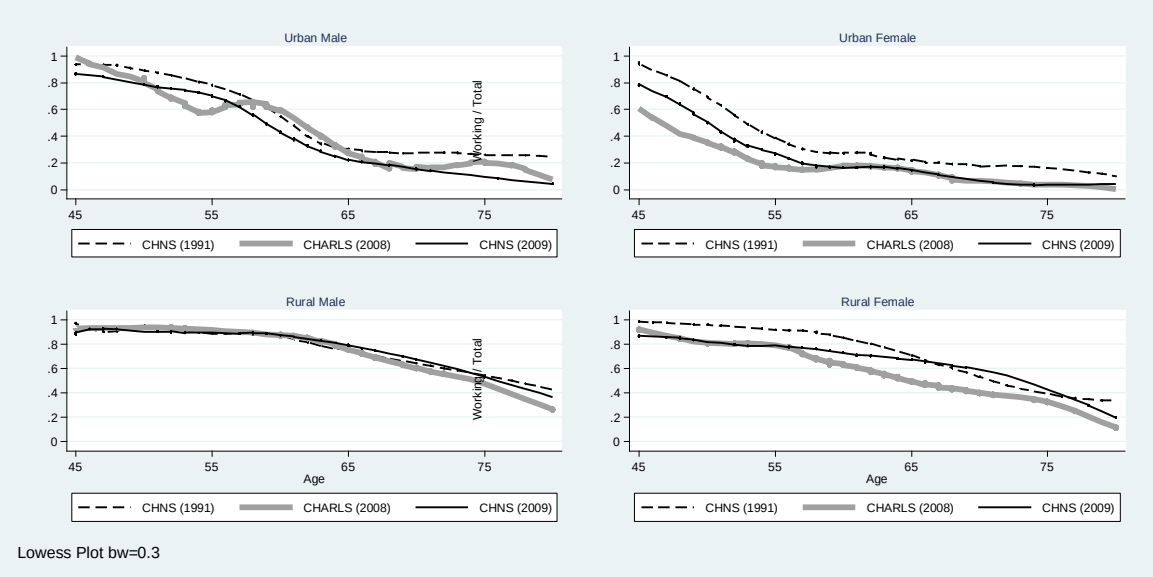
Sohn MJ (2007) The characteristics of the recent trend of self-employment. SERI Economic Focus 146: 39-55.

Vere JP (2011) Social security and elderly labor supply: evidence from the Health and Retirement Study, Labor Economics (in press).

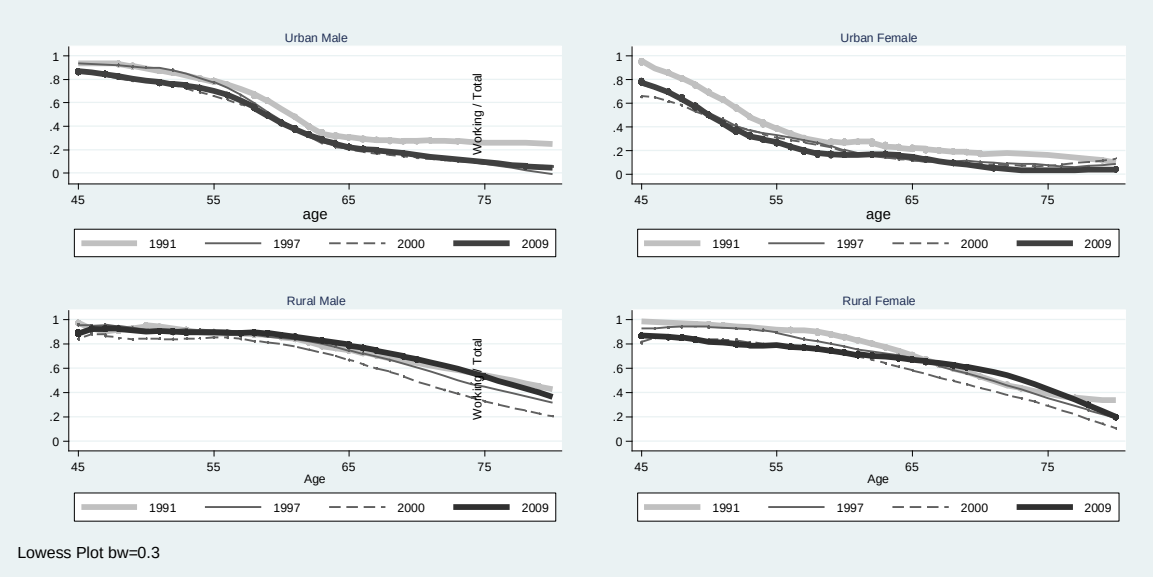
Venti, S and Wise, D (2004) "Aging and housing equity: Another look" in *Perspectives on the Economics of Aging*, David Wise (eds). Chicago: University of Chicago Press.

Figure 1
Employment Rates by Age Cohort of Older Workers and Elderly in Urban and Rural China

Panel A. Employment Rates by Age Cohort: CHNS and the CHARLS (2008) Pilot

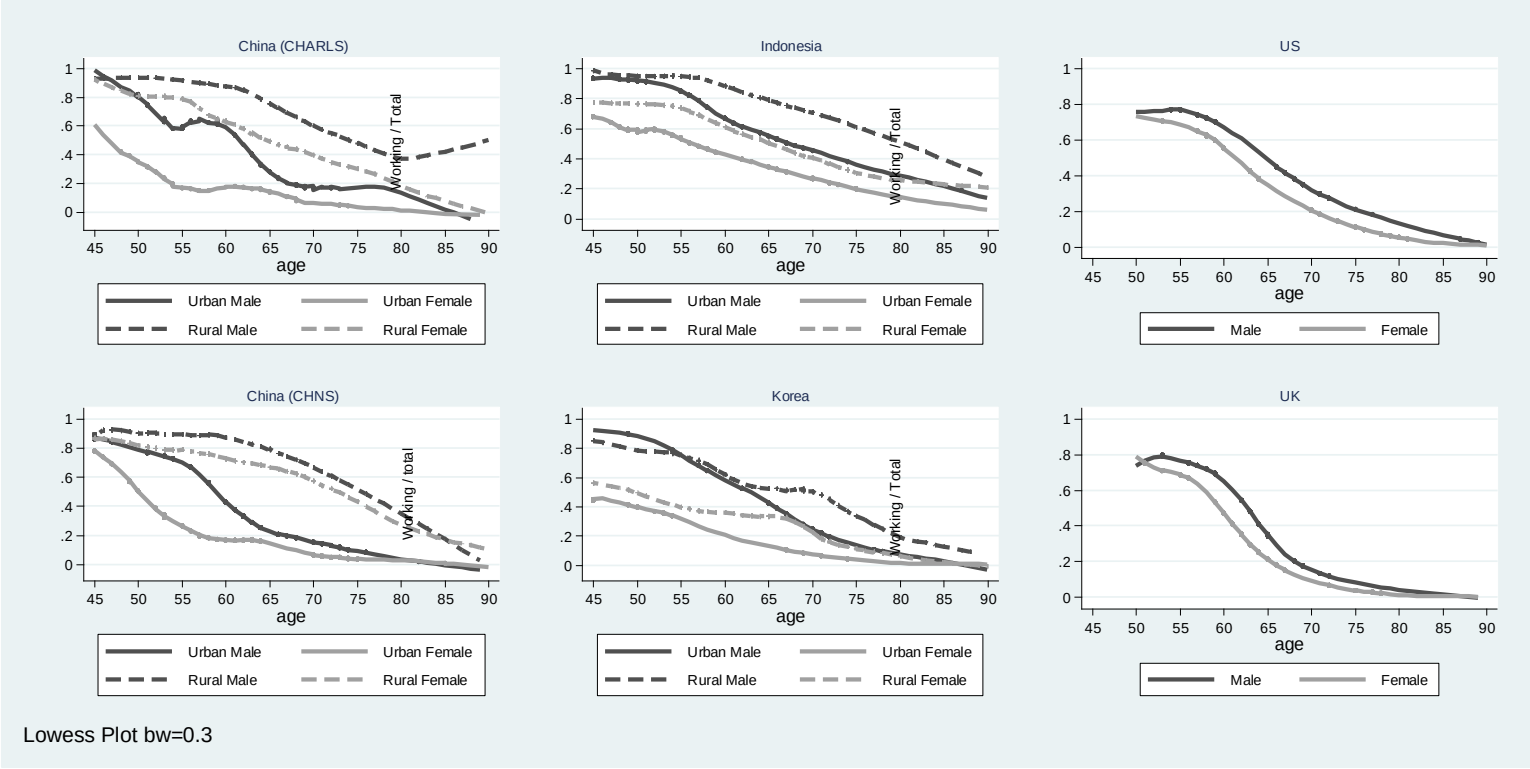


Panel B. Employment Rates by Age Cohort: CHNS (1991 – 2009)



Notes: Employment rates by age cohort are calculated using non-parametric locally weighted regression (LOWESS) with a bandwidth of 0.3. Panel A and B use data from the common provinces surveyed across waves of the China Health and Nutrition Survey (CHNS) conducted from 1991 to 2009. Panel A also includes data from the 2008 China Health and Retirement Longitudinal Study (CHARLS) Pilot.

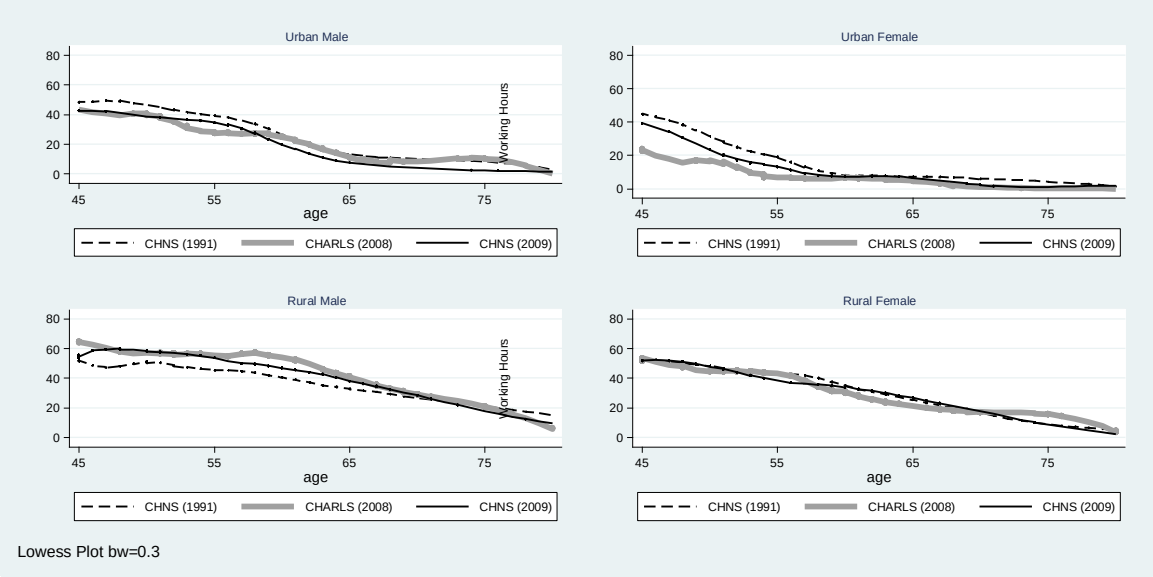
Figure 2
Employment Rates by Age Cohort in China, Indonesia, Korea, the UK and the US



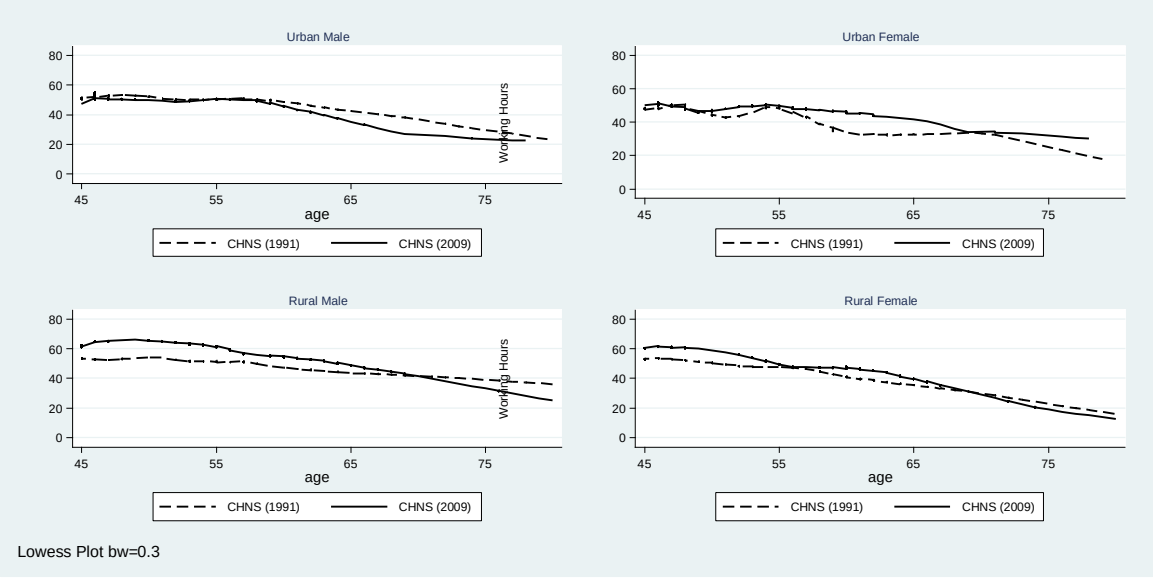
Notes: Employment rates by age cohort are calculated using non-parametric locally weighted regression (LOWESS) with a bandwidth of 0.3. The following data sources are used: China: 2009 CHNS and the 2008 CHARLS pilot; Indonesia: 2007 Indonesia Family Life Survey (IFLS); Korea: 2006 Korean Longitudinal Study of Aging (KLoSA); United States: 2008 Health and Retirement Survey (HRS); United Kingdom: 2008/9 English Longitudinal Study of Ageing (ELSA).

Figure 3
Work-Intensity of Older Workers and Elderly in China

Panel A Average Hours of Work Per Week (Unconditional on Work Status)



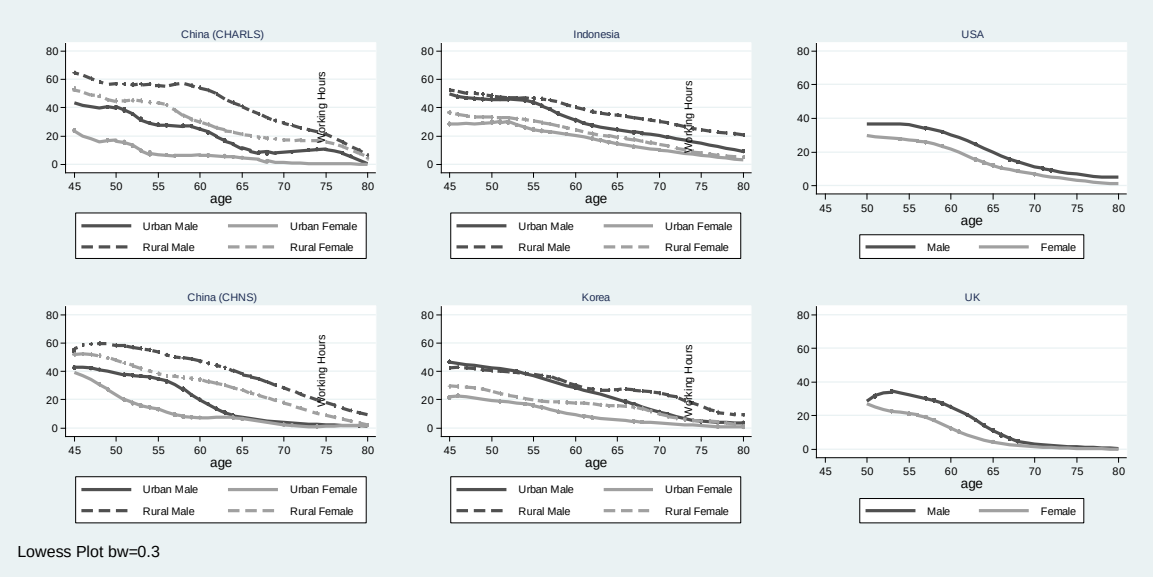
Panel B Average Hours of Work Per Week (Conditional on Working)



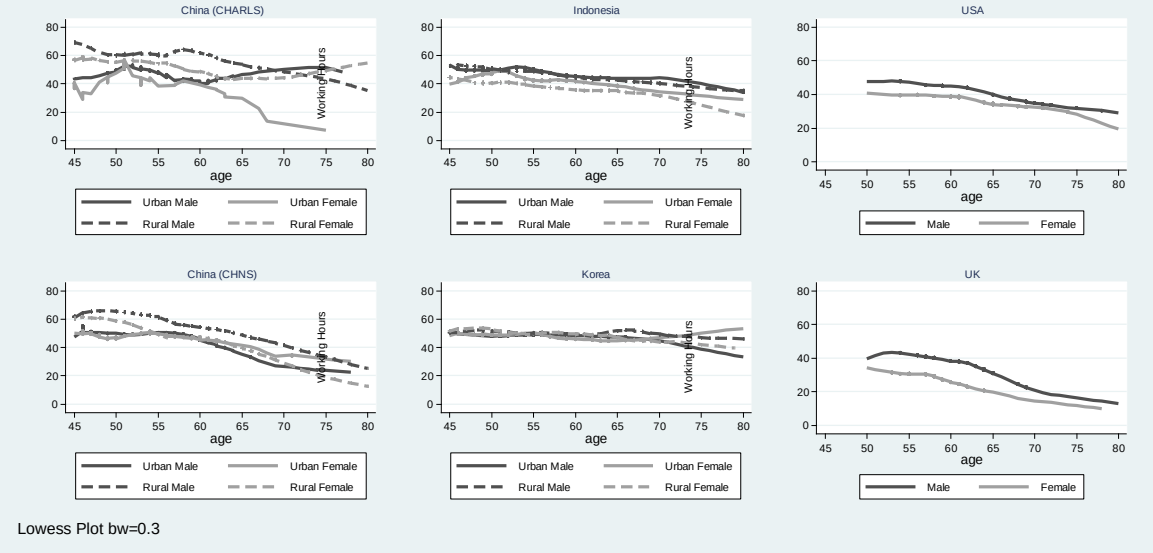
Notes: Average hours worked per week by age cohort are calculated using non-parametric locally weighted regression (LOWESS) with a bandwidth of 0.3. Panel A presents results unconditional on working which use the 1991 and 2009 waves of the CHNS, and the 2008 CHARLS pilot. Because of the small sample of respondents who were working in urban areas in the CHARLS pilot, results conditional on working (Panel B) are only estimated using the CHNS.

Figure 4
Work-Intensity of Older Workers and Elderly in China and Four Countries
(China, Indonesia, Korea, US and UK)

Panel A Average Hours of Work Per Week (Unconditional on Work Status)



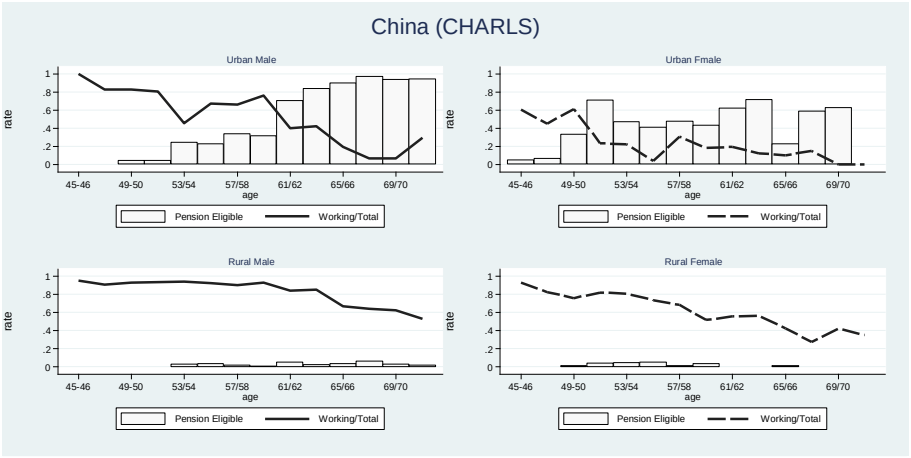
Panel B Average Hours of Work Per Week (Conditional on Working)



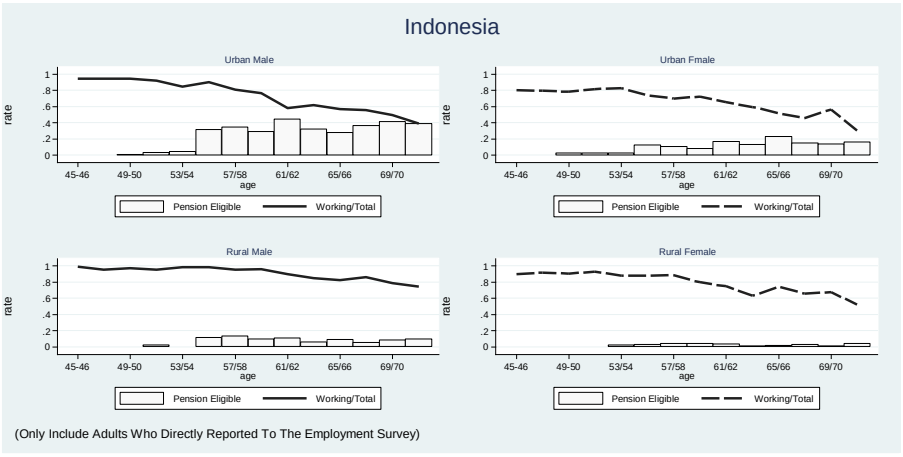
Notes: Average hours worked per week by age cohort are calculated using non-parametric locally weighted regression (LOWESS) with a bandwidth of 0.3. The following data sources are used: China: 2009 CHNS and the 2008 CHARLS pilot; Indonesia: 2007 Indonesia Family Life Survey (IFLS); Korea: 2006 Korean Longitudinal Study of Aging (KLoSA); United States: 2008 Health and Retirement Survey (HRS); United Kingdom: 2008/9 English Longitudinal Study of Ageing (ELSA).

Figure 5
Employment Patterns and Access to Pensions Across Rural and Urban Areas of China, Indonesia and Korea

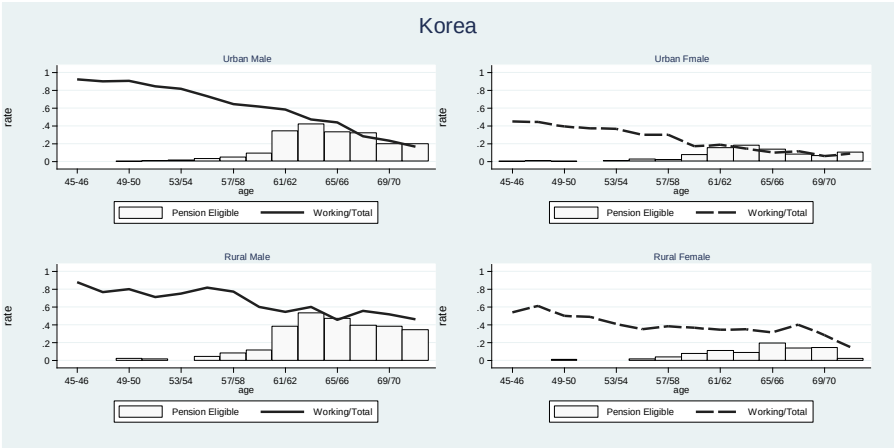
Panel A China



Panel B Indonesia



Panel C Korea



Notes: Calculated using the 2008 CHARLS pilot (China), 2007 IFLS (Indonesia) and the 2006 KLoSA (Korea).

Table 1
Descriptive Characteristics of Analysis Samples from China, Indonesia and Korea

Variable	Obs	Mean	Std. Dev.	Min	Max
	CHARLS (China)				
Work	2595	0.66	0.47	0.00	1.00
1 Urban 2 Rural	2595	1.81	0.39	1.00	2.00
Women	2595	0.52	0.50	0.00	1.00
Age	2595	59.12	10.61	34.00	93.00
Years of Education	2595	2.95	4.13	0.00	19.00
Pension Eligible	2595	0.09	0.29	0.00	1.00
Married	2595	0.84	0.37	0.00	1.00
Spouse Pension Eligible	2595	0.08	0.28	0.00	1.00
Spouse Working	2595	0.58	0.49	0.00	1.00
Average Education of Spouse and Adult Children	2595	1.87	2.11	0.00	15.00
Housing Wealth Per Capita	2595	5.74	16.00	-0.67	213.33
Number of Grandchildren	2595	3.33	3.89	0.00	30.00
Number of Living Parents	2595	0.81	1.04	0.00	4.00
(I)ADL Z-Score(W/Difficulty)	2595	0.01	1.01	-0.63	6.01
(I)ADL Z-Score(Unable)	2595	0.00	1.01	-0.25	11.55
Spouse (I)ADL Z-Score(W/Difficulty)	2595	-0.04	0.86	-0.63	6.01
Spouse (I)ADL Z-Score(Unable)	2595	-0.04	0.77	-0.25	11.55
	IFLS (Indonesia)				
Work	7283	0.78	0.42	0.00	1.00
I Urban 0 Rural	7283	0.48	0.50	0.00	1.00
Women	7283	0.57	0.49	0.00	1.00
Age	7283	55.52	10.26	34.00	100.00
Years of Education	7283	5.26	4.57	0.00	22.00
Pension Eligible	7283	0.06	0.24	0.00	1.00
Married	7283	0.77	0.42	0.00	1.00
Spouse Pension Eligible	7283	0.04	0.20	0.00	1.00
Spouse Working	7283	0.61	0.49	0.00	1.00
Average Education of Spouse and Adult Children	7283	7.38	4.31	0.00	22.00
Housing Wealth Per Capita	7283	2.23	1.27	0.00	6.91
Number of Living Parents	7283	0.81	0.97	0.00	4.00
(I)ADL Z-Score(W/Difficulty)	7283	-0.05	0.88	-0.54	7.91
(I)ADL Z-Score(Unable)	7283	-0.13	0.59	-0.34	8.07
Spouse (I)ADL Z-Score(W/Difficulty)	7283	-0.09	0.67	-0.54	6.97
Spouse (I)ADL Z-Score(Unable)	7283	-0.14	0.42	-0.34	8.07
	KLoSA (Korea)				
Worker	10036	0.38	0.49	0.00	1.00
1 Urban 0 Rural	10036	0.77	0.42	0.00	1.00
Women	10036	0.56	0.50	0.00	1.00
Age	10036	61.52	11.08	45.00	105.00
Years of Education	10036	8.51	4.42	0.00	21.00
Pension Eligible	10036	0.10	0.30	0.00	1.00
Married	10036	0.78	0.41	0.00	1.00
Spouse Pension Eligible	10036	0.07	0.25	0.00	1.00
Spouse Working	10036	0.29	0.45	0.00	1.00
Average Education of Spouse and Adult Children	10036	11.54	4.01	0.00	21.00
Housing Wealth Per Capita	10036	4.61	10.02	0.00	300.00
Number of Grandchildren	10036	3.32	4.04	0.00	34.00
Number of Living Parents	10036	0.67	0.94	0.00	4.00
(I)ADL Z-Score(W/Difficulty)	10036	-0.01	1.00	-0.28	10.43
(I)ADL Z-Score(Unable)	10036	0.00	0.99	-0.18	9.27
Spouse (I)ADL Z-Score(W/Difficulty)	10036	-0.03	0.72	-0.28	10.43
Spouse (I)ADL Z-Score(Unable)	10036	-0.02	0.77	-0.18	9.27

Notes: We use the following cross section surveys for analysis: 2008 CHARLS Pilot for China; 2007/8 IFLS for Indonesia; and the 2006 KLoSA for Korea. Units for housing wealth per capita are Korea (10,000,000 Won), China (10,000 RMB), Indonesia (1,000,000 Rupiahs). The definitions are slightly different given the design of the questions. Whether or not collecting pension is used as proxy for pension eligibility

Table 2
Pension Eligibility and Health Status in the Labor Supply of Adults Over 45

Linear Probability Models, Dependent Variable: Worked at Least One Hour per Week

	China (CHARLS)				Indonesia(IFLS)				Korea(KLoSA)			
	Urban		Rural		Urban		Rural		Urban		Rural	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Age	-0.067	-0.088***	0.016	0.005	0.021**	0.075***	0.023***	0.032***	-0.058***	-0.051***	-0.015	-0.023*
	(0.04)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Age-Squared	0.000	0.001***	-0.000*	-0.000*	-0.000***	-0.001***	-0.000***	-0.000***	0.000***	0.000***	-0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years of Education	0.003	-0.032*	-0.009	-0.040**	-0.009	-0.015**	-0.002	-0.004	0.011	0.008	0.031**	0.018*
	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Years of Education-Squared	0.000	0.003***	0.001	0.004**	0.000	0.002***	0.000	0.000	-0.000	-0.000	-0.002**	-0.001*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pension Eligible	-0.152*	-0.183***	-0.123*	0.003	-0.238***	-0.246***	-0.132***	-0.126*	-0.107***	-0.021	-0.039	0.014
	(0.08)	(0.06)	(0.07)	(0.12)	(0.03)	(0.05)	(0.03)	(0.07)	(0.02)	(0.03)	(0.04)	(0.05)
Spouse Pension Eligible	0.048	0.029	0.060	-0.182***	-0.119**	-0.040	0.103	-0.055	-0.051	-0.040*	0.043	-0.070*
	(0.07)	(0.08)	(0.10)	(0.06)	(0.05)	(0.04)	(0.08)	(0.05)	(0.05)	(0.02)	(0.10)	(0.04)
Average Education of Spouse and Adult Children	-0.006	0.003	-0.008	0.007	-0.004	-0.010***	-0.000	-0.003	0.007***	-0.009***	-0.001	-0.000
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Ln(Housing Wealth P.C.+1)	-0.061**	-0.013	-0.010	-0.028*	0.002	-0.001	0.002	0.003	0.017**	-0.016***	0.008	-0.024
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Number of Living Parents	0.011	0.065**	0.018	-0.003	0.011	0.029**	-0.003	0.005	0.008	-0.011	0.031	-0.017
	(0.03)	(0.03)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Number of Grandchildren	0.005	-0.009	-0.009**	-0.006					-0.006**	-0.003	0.009*	0.007**
	(0.02)	(0.02)	(0.00)	(0.00)					(0.00)	(0.00)	(0.00)	(0.00)
(I)ADL Z-Score(W/Difficulty)	-0.049	-0.027	-0.075***	-0.072***	-0.100***	-0.068***	-0.066***	-0.072***	-0.035***	-0.013**	-0.066***	-0.008
	(0.04)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
(I)ADL Z-Score(Unable)	-0.003	-0.010	-0.080***	-0.050***	-0.110***	-0.070***	-0.135***	-0.093***	-0.033***	-0.007	-0.036***	-0.026*
	(0.04)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	256	236	1,000	1,103	1,505	2,004	1,613	2,161	3,413	4,356	1,005	1,262
R-squared	0.464	0.458	0.308	0.325	0.328	0.133	0.316	0.154	0.384	0.169	0.247	0.192

Notes: These regression models contain indicator for married, spouse information not present and dummy for No-existence of Adult Children. Control variables not presented in the table are (Dummy=1 if Spouse Is Not Present), (Dummy==1 if the Individual Does Not Have Non-schooling Adult Children) and location dummies(China: county; Indonesia: Kabupaten; Korea: metropolitan city and province). Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1

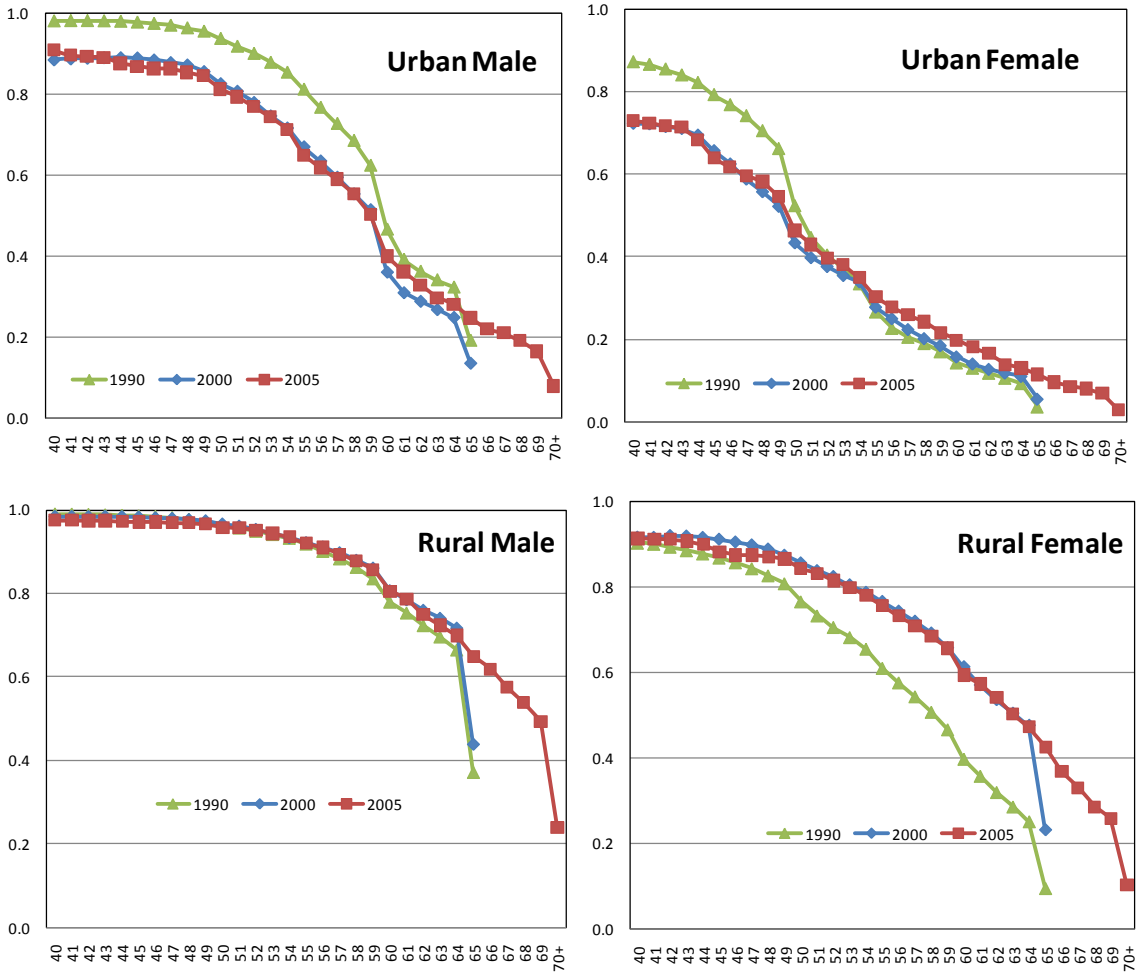
Table 3
Spouse Health and Work Status in Labor Supply Decisions of Adults Over 45

Linear Probability Models, Dependant Variable: Worked at Least One Hour per Week

	China (CHARLS)				Indonesia (IFLS)				Korea (KLoSA)			
	Urban		Rural		Urban		Rural		Urban		Rural	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	work	work
Pension Eligible	-0.134*	-0.194***	-0.127*	-0.031	-0.235***	-0.240***	-0.129***	-0.136*	-0.104***	-0.020	-0.008	0.024
	(0.08)	(0.06)	(0.07)	(0.12)	(0.03)	(0.05)	(0.03)	(0.07)	(0.02)	(0.03)	(0.03)	(0.05)
Spouse Pension Eligible	0.106	0.087	0.084	-0.136**	-0.104**	-0.015	0.110	-0.028	-0.050	-0.037*	0.047	-0.061*
	(0.07)	(0.08)	(0.10)	(0.06)	(0.05)	(0.04)	(0.08)	(0.05)	(0.05)	(0.02)	(0.09)	(0.03)
Spouse Working	0.196***	0.202***	0.121***	0.193***	0.047**	0.091**	0.088***	0.231***	0.054***	0.025	0.354***	0.339***
	(0.07)	(0.07)	(0.03)	(0.04)	(0.02)	(0.04)	(0.02)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)
Ln(Housing Wealth P.C.+1)	-0.062**	-0.001	-0.007	-0.026	0.002	-0.001	0.002	0.003	0.018**	-0.016***	0.015	-0.023
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
(I)ADL Z-Score(W/Difficulty)	-0.061	-0.027	-0.083***	-0.083***	-0.101***	-0.069***	-0.063***	-0.071***	-0.034***	-0.012*	-0.062***	-0.007
	(0.04)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
(I)ADL Z-Score(Unable)	0.005	-0.005	-0.079***	-0.048***	-0.107***	-0.070***	-0.133***	-0.093***	-0.032***	-0.007	-0.038***	-0.019
	(0.04)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Spouse (I)ADL Z-Score(W/Difficulty)	0.068	0.031	0.031**	0.052***	0.016	0.005	-0.020**	0.031**	-0.016	0.003	0.005	0.008
	(0.04)	(0.04)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Spouse (I)ADL Z-Score(Unable)	-0.016	-0.014	0.003	0.003	0.030	-0.052	0.008	0.016	-0.011	-0.008	-0.038	0.016
	(0.05)	(0.04)	(0.01)	(0.02)	(0.02)	(0.03)	(0.01)	(0.02)	(0.01)	(0.01)	(0.03)	(0.01)
Observations	256	236	1,000	1,103	1,505	2,004	1,613	2,161	3,413	4,356	1,005	1,262
R-squared	0.489	0.482	0.320	0.343	0.332	0.138	0.330	0.164	0.386	0.169	0.329	0.265

Notes: These regression models include age, age-squared, years of education, years of education-squared, average education of spouse and adult children, number of living grandparents, number of grandchildren, indicator variables for married, for spouse information not present and for no adult children, and city dummies (China: county; Indonesia: Kabupaten; Korea: metropolitan city and province). Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1

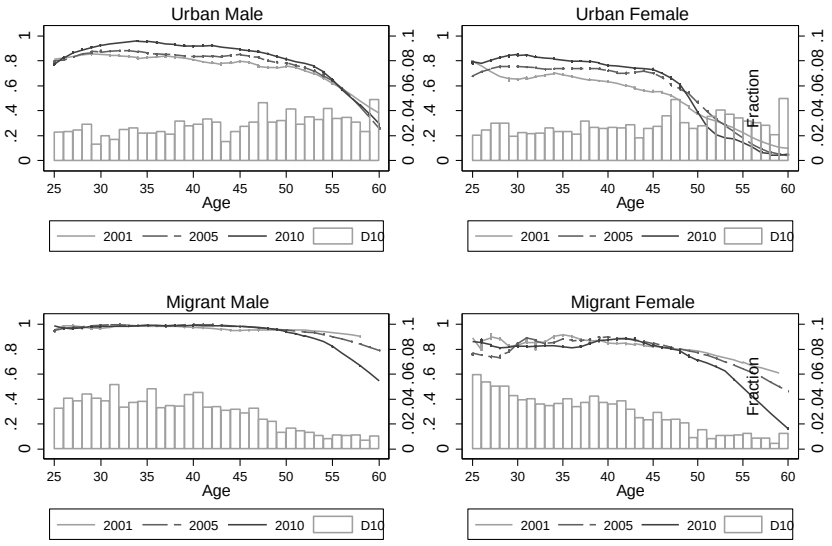
Figure A.1
Employment Rates by Age Cohort in China: Cohort Averages from the Population Census and One Percent Population Sample



Source: National Bureau of Statistics, 2000 Population Census Statistical Materials (2002) and 2005 One-Percent Population Sample Statistical Materials (2007), China Statistics Press, Beijing.

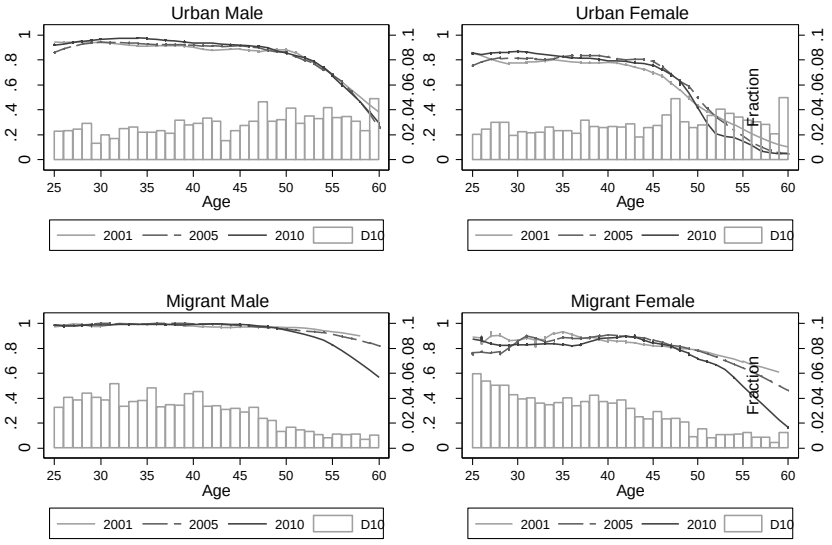
Figure A.2
Employment and Labor Force Participation in China: Evidence from the China Urban Labor Survey

A. Employed Share



(D10: sample distribution in 2010)

B. Labor Force Participation Rate



(D10: sample distribution in 2010)

Source: China Urban Labor Survey (CULS) from 2001, 2005 and 2010. The CULS team worked with local offices of the National Bureau of Statistics to collect representative samples of local and migrant households. In the 2010 survey round, this included 700 local resident households and 600 migrant households per city surveyed. In the first wave, there were 600 local households and 500 migrants sampled per city. Descriptive statistics are presented for the five cities where the survey was implemented in 2001, 2005 and 2010: Fuzhou, Shanghai, Shenyang, Wuhan and Xian. The CULS was developed and administered by the Institute for Population and Labor Economics at the Chinese Academy of Social Sciences (CASS-IPLE) with consultation from faculty at University of Oxford and researchers from the World Bank.